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### [1. AF12-BT01: Statistically Defensible Comparison of Similar But Disparate Tests](#)

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop reliable methods for making statistically valid conclusions from test data sets that do not lend themselves to traditional statistical techniques. DESCRIPTION: There are times when it is necessary to compare functional performance between subsystems where the base platform is not identical. A common form of this is when a subsystem upgrade is tested many years after testin ...

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### [2. AF12-BT02: Low Level Signal Detection for Passive Electro-Optical Space-based Surveillance](#)

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Conceive and develop methods and techniques for optimizing signal detection and noise reduction for passive Signature Exploitation of lambertian scattered light modulated by vibrating surfaces with intended application from space. DESCRIPTION: Achieving space-based surveillance requires detecting not only with a limited number of photons but also with potentially small fractional m ...

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### **[3. AF12-BT03: Biologically-inspired integrated vision systems](#)**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Human-engineered imaging sensors are anthropomorphic and in some respects very limited in capability. Develop an advanced imaging sensor concept that samples all of the information in the radiation field, taking inspiration from biological systems.

DESCRIPTION: Develop advanced imaging sensors specifically designed to utilize most if not all of the information in the light field ( ...

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### **[4. AF12-BT04: Ultra-High-Performance Concrete](#)**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop ultra high performance concrete (UHPC) materials and processes needed to produce large, high-strength test structures. DESCRIPTION: Concrete materials science has experienced a revolutionary advance in terms of the aggregates, matrix, bonding agents, accelerators, plasticizers, and other additives employed to produce high-strength forms and structures capable of withstanding ...

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### **[5. AF12-BT05: Real-time Location of Targets in Cluttered Environments](#)**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: To develop a process for real-time radar location of targets in cluttered environments, specifically air traffic targets in environments complicated by complex natural (e.g., hills and valleys) and manmade (e.g., wind turbines) features. DESCRIPTION: Our nation is developing a diverse range of renewable energy projects. Some of these energy production sites are located near existing ...

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### **[6. AF12-BT06: Innovative Electro Optic Signature Exploitation for Recognition Advancements](#)**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: This topic seeks innovative methods for deriving a sparse set of physical target features that can be used for exploitation of air to ground signature data collected from electro-optic measurement systems including EO, IR and LADAR. DESCRIPTION: Current methods for exploiting EO signature data include statistical pattern recognition techniques and model based approaches. Model-based ...

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## **7. AF12-BT07: Miniaturized, Power Efficient C-band Telemetry**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop a miniaturized, power efficient C-band telemetry (TM) transmitter with performance comparable to current state of the art miniaturized S-band transmitters. DESCRIPTION: A miniaturized TM subsystem for an airborne transmitter is needed in the 1-2 cubic inch form factor to support existing efforts to miniaturize flight test instrumentation. C-band transmitter RF devices are ...

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## **8. AF12-BT08: Compact, Low-Cost THz Test System**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop a compact, low-cost test system with integrated control of temperature, electric field, and magnetic field for non-destructive characterization of novel electronic materials and devices at THz frequencies. DESCRIPTION: The region from 0.1 THz (1011 Hz) to 10 THz (1013 Hz) is a largely unexplored region of the electromagnetic spectrum. The lower end of this region, 94 GHz, i ...

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## **9. AF12-BT09: Game-Theoretic based Decision Support Tools for Persistent Space Denial**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop new game decision models and efficient computational algorithms for autonomous space systems with the capabilities for self defense when there are potential adversarial strikes. DESCRIPTION: Former Air Force Space Command (AFSPC) Commander General Lance Lord defined space situation awareness (SSA) in simple terms: "The foundation of Space Superiority is Space Situation Aware ...

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## **10. AF12-BT10: Cryodeposit Mitigation and Removal Techniques for Radiometric Calibration Chambers**

Release Date: 07-26-2012 Open Date: 08-27-2012 Due Date: 09-26-2012 Close Date: 09-26-2012

OBJECTIVE: Develop materials and instruments for cryodeposit mitigation and removal in radiometric calibration chambers. DESCRIPTION: A better understanding of the cryodeposition process is required such that techniques can be developed to successfully remove cryodeposits that can be such a problem in test chamber performance. Water ice layers on the order of 100nm (and greater) can signific ...

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